

**PRELIMINARY
HYDROLOGY/DRAINAGE STUDY**

For

**FOXHILL RESIDENCE
& BOUNDARY ADJUSTMENT**

*7007 Country Club Drive
La Jolla, CA 92037
Portion of Lot 1263 of MM 36 & Parcel 1 of PM 21506*

City of San Diego
*SDP No. 1790091 / Tentative Plan No. 2330219 / CDP No. 2330222
PTS No. 508125*

Applicant/Developer:
Manchester Foxhill, LLC
*7007 County Club Drive
La Jolla, CA 92037
Contact: Robert Aguilar*

Snipes-Dye Associates
civil engineers and land surveyors

*8348 Center Drive, Suite G
La Mesa, CA 91942-2910
(619) 697-9234, Fax (619) 460-2033
SDA No. LJ4742*

*Dated: June 7, 2019
Revised: September 23, 2020*

DECLARATION OF RESPONSIBLE CHARGE

I, HEREBY DECLARE THAT I AM THE CIVIL ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITY FOR PROJECT DESIGN.



SON P. NGUYEN
R.C.E. 86249
EXP. 03-31-21

9-23-20
DATE



TABLE OF CONTENTS

	<u>Page</u>
Project Information.....	1
Drainage Maps.....	8
Pre-Development Calculations.....	11
Post-Development Calculations.....	15
Post-Development Calculations (Mitigated).....	21
Detention Calculations.....	27

**PRELIMINARY HYDROLOGY AND HYDRAULIC CALCULATIONS
FOR
FOXHILL RESIDENCE & BOUNDARY ADJUSTMENT**

The project is located at 7007 Country Club Drive with Assessor's Parcel Nos. 352-300-04 & 352-300-09. The project proposes to grade approximately 0.59 acre for the construction of a two-story guest house and an access concrete driveway that will connect to an existing concrete driveway. The following hydrology calculations were prepared utilizing AES Hydrology software and the 2017 City of San Diego Drainage Design Manual criteria. The manual allows for a weighted C value based on the actual percentage area of impervious surface. See the enclosed runoff factor calculations for determination of C factors for each of the pre- and post-development drainage basins.

PRE-DEVELOPMENT CONDITIONS: The existing site currently has an existing single-family residence located on the central portion of the site with an existing concrete paved driveway along the southerly portion of the site which is accessed from Country Club Drive near the most southerly corner of the site. The existing drainage within the site is divided up into four drainage basins (refer to Pre-Development Drainage Map located in this report). Drainage basins 1 and 3 consist of natural sheet flows in a general southeasterly direction that are directed towards an existing dirt trail where runoff is eventually discharged at the end of the trail just south of the site over the existing slopes. The peak 100-year storm event discharge for these basins are 0.36 cfs and 0.41 cfs, respectively. Drainage basin 2 sheet flows in a general southwesterly direction onto an existing asphalt paved driveway that directs flow into the existing street gutter on Country Club Drive where it eventually enters the existing public storm drain system via a curb inlet. Drainage basin 4 also consists of sheet flow that is carried mainly along the existing concrete driveway in a general southerly direction and discharges near the end of Country Club Drive through an existing curb opening into the existing slopes. The peak 100-year storm event discharges for drainage basins 2 and 4 are 2.77 cfs and 1.61 cfs, respectively. The total pre-development 100-year peak discharge for the project area is 5.15 cfs.

POST-DEVELOPMENT CONDITIONS: As part of the proposed project, the site will go through a coastal development permit process to adjust the property lot lines to create two separate single-family residential lots. One of the newly created lots will accommodate the existing single-family residence and its appurtenances, while the other lot will accommodate the proposed development consisting of a new two-story residence and a concrete driveway annexation to the existing concrete paved driveway. The proposed development will maintain similar drainage patterns as in the existing condition, and will consist of four main drainage basins (refer to the enclosed Post-Development Drainage Map). Drainage basin 1 is comprised of two sub-basins: 1A and 1B. Sub-basin 1A consists of runoff from the proposed main residence and its adjacent landscape areas. Runoff from the house rooftop will be directed through roof gutters onto the adjacent landscape areas prior to entering a proposed storm drain system that will direct runoff into a proposed biofiltration with partial retention basin which will provide some mitigation of the 100-year peak discharge. Sub-basin 1B consists of an existing natural slope area and will also be collected in the proposed

biofiltration basin with partial retention. Any peak flows exceeding the low flow threshold in the biofiltration basin will exit through a weir and will dissipate as sheet flow due to the rock rip-rap located at the downstream side of the biofiltration basin where it will continue along the existing dirt trail as it does in the current condition discharging at the end of the trail just south of the site at the same location as the runoff from drainage basin 3. The total peak 100-yr. discharge after mitigation is approximately 0.02 cfs. Drainage basin 2 will discharge similar to the pre-development condition, where runoff from this area will sheet flow onto the existing asphalt paved driveway located along the westerly property line and enter the existing street gutter on Country Club Drive where it eventually will be directed to the existing public storm drain system via a curb inlet. Drainage sub-basin 3A consists of flow from the proposed concrete paved driveway which will discharge into a proposed catch basin where it will be pumped to a proposed biofiltration with partial retention basin located about 50 feet south of the proposed residence. The mitigated 100-peak flow from this basin will be roughly 0.01 cfs. Drainage sub-basin 3B consists of landscaped slope area that will sheet flow with a peak 100-year discharge of roughly 0.16 cfs. Drainage basin 4 (comprised of sub-basins 4A & 4B) will sheet flow as it does in the current condition, with runoff being carried mainly along the existing concrete driveway in a general southwesterly direction and discharging near the end of Country Club Drive through an existing curb opening into the existing slopes. The peak 100-year storm event discharge for drainage basin 4 is 1.10 cfs. The total peak mitigated discharge of the 100-year frequency for the project site is 3.79 cfs, which is a 1.36 cfs reduction from the pre-development condition.

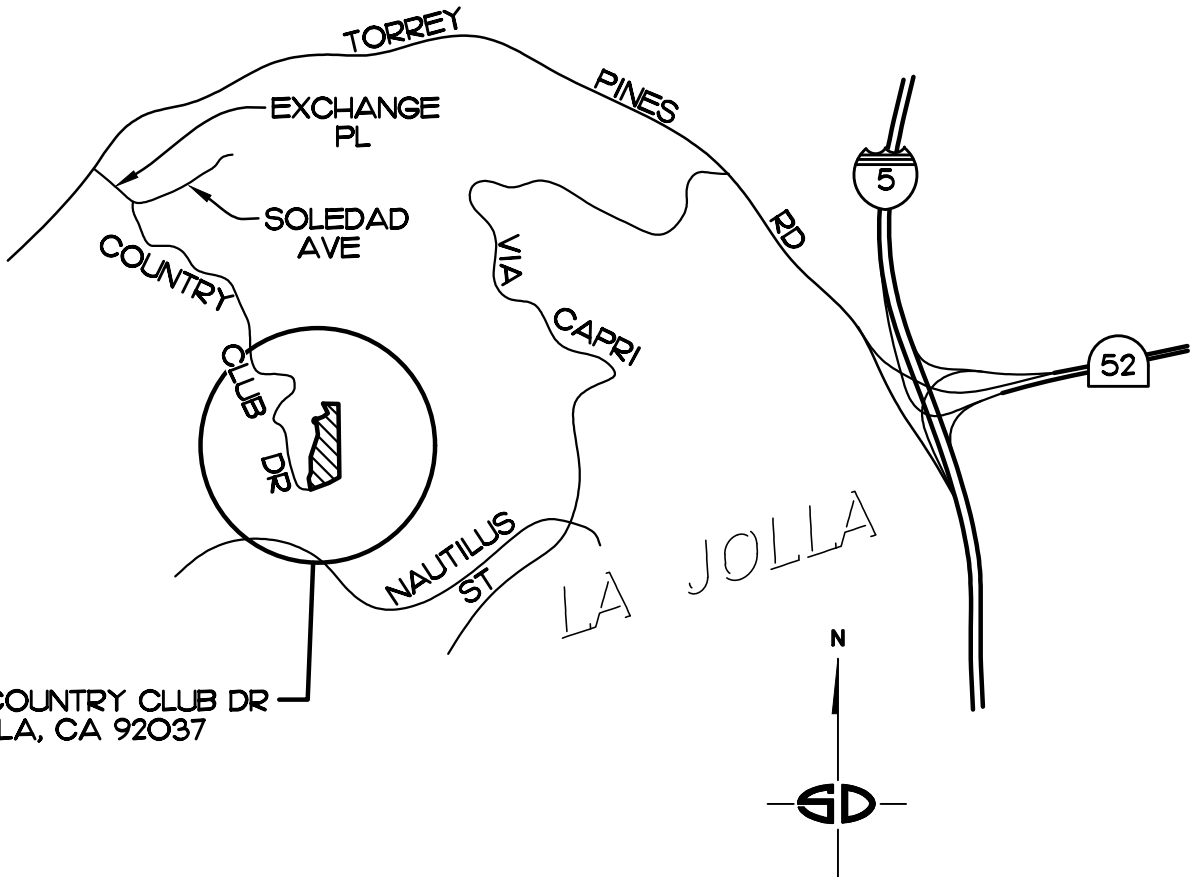
The following table is a summary of the 100-year peak discharges for the pre- and post-development conditions:

SUMMARY OF 100-YEAR, 6-HOUR STORM EVENT

<i>Basin ID</i>	<i>Pre-Development</i>		<i>Post-Development</i>		<i>Post-Development With Mitigation</i>	
	<i>Area (acres)</i>	<i>Discharge Q₁₀₀ (cfs)</i>	<i>Area (acres)</i>	<i>Discharge Q₁₀₀ (cfs)</i>	<i>Area (acres)</i>	<i>Discharge Q₁₀₀ (cfs)</i>
1	0.16	0.36	0.49	1.59	0.49	0.02
2	1.24	2.77	1.15	2.50	1.12	2.50
3	0.18	0.41	0.15	0.94	0.29	0.17
4	0.72	1.61	0.44	1.10	0.40	1.10
TOTAL	2.30 ac.	5.15 cfs	2.30 ac.	6.13 cfs	2.30 ac.	3.79 cfs

CONCLUSION:

- The peak 100-year discharge from the post-development after mitigation will be less than the discharge in the pre-development condition.
- There will be no negative impacts to downstream and/or adjacent properties / drainage facilities due to the construction of the proposed development.
- The project site does not impact waters of the U.S., therefore it is not subject to CWA 401/404 regulations.



7007 COUNTRY CLUB DR
LA JOLLA, CA 92037

VICINITY MAP
NO SCALE

SOIL TYPE FOXHILL GUEST QUARTERS

APPENDIX A: RATIONAL METHOD AND MODIFIED RATIONAL METHOD

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C) Soil Type ⁽¹⁾
Residential:	
Single Family (Assumed 50% Imperviousness)	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than 1/2 acre)	0.45
Commercial ⁽²⁾	
80% Impervious	0.85
Industrial ⁽²⁾	
90% Impervious	0.95

Note:

⁽¹⁾ Type D soil to be used for all areas.

⁽²⁾ Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 60%

Tabulated imperviousness (For Single-Family) = 50%

Revised C = $(60/50) \times 0.55$ = 0.66

The values in Table A-1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

Pre-Development - Foxhill Guest Quarters TM

Basin	1	2	3	4
Impervious Area (SF)	0	9,089	0	11,165
Total Basin Area (SF)	7,178	53,911	7,422	31,492
Actual imperviousness (AI) = Imp. Area/Total Area	0%	17%	0%	35%
Tabulated imperviousness =	50%	50%	50%	50%
For Single-Family: Revised C = $(AI/50) \times 0.55$, 0.50 Minimum For	0.00	0.19	0.00	0.39
Rural: C = 0.45				
Use	0.50	0.50	0.50	0.50

APPENDIX A: RATIONAL METHOD AND MODIFIED RATIONAL METHOD

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Post-Development - Foxhill Guest Quarters TM

Basin	1A	1B	2	3A
Impervious Area (SF)	10,721	0	10,677	6,786
Total Basin Area (SF)	14,235	7,178	48,975	9,491
Actual imperviousness (AI) = Imp. Area/Total Area	75%	0%	22%	71%
Tabulated imperviousness =	50%	50%	50%	50%
For Single-Family: Revised C = $(AI/50) \times 0.55$, 0.50 Minimum For	0.83	0.00	0.24	0.79
Rural: C = 0.45				
Use	0.83	0.50	0.50	0.79

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Residential:	
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Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than 1/2 acre)	0.45
Commercial ⁽²⁾	
80% Impervious	0.85
Industrial ⁽²⁾	
90% Impervious	0.95

Note:

⁽¹⁾ Type D soil to be used for all areas.

⁽²⁾ Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 60%

Tabulated imperviousness (For Single-Family) = 50%

Revised C = $(60/50) \times 0.55$ = 0.66

The values in Table A-1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

Post-Development - Foxhill Guest Quarters TM

Basin	3B	4A	4B
Impervious Area (SF)	0	4,914	3,922
Total Basin Area (SF)	2,997	6,751	10,912
Actual imperviousness (AI) = Imp. Area/Total Area	0%	73%	36%
Tabulated imperviousness =	50%	50%	50%
For Single -Family: Revised C = $(AI/50) \times 0.55$, 0.50 Minimum Rural: C = 0.45	0.00	0.80	0.40
Use	0.50	0.80	0.50

DRAINAGE MAPS



PRELIMINARY PRE-CONSTRUCTION DRAINAGE MAP
FOXHILL RESIDENCE
7007 COUNTRY CLUB DRIVE
LA JOLLA, CA 92037

DESIGNER: SNIPES-DYE ASSOCIATES
 REVISION: 06-07-19
 SHEET NO. 1 OF 1

PROJECT NO. 8348
 DATE: 06-07-19

BY: [Signature]
 DATE: [Blank]

REVISION DESCRIPTION: [Blank]

NO. 1
 DATE: 1-20-20
 DESCRIPTION: REVISED PER UPDATED SITE PLAN AND FIRST REVIEW CYCLE.

NO. 2
 DATE: 09-21-20
 DESCRIPTION: REVISED PER 1ST CYCLE REVIEW FROM DEVELOPMENT SERVICES DEPARTMENT.

NO. 3
 DATE: [Blank]
 DESCRIPTION: [Blank]

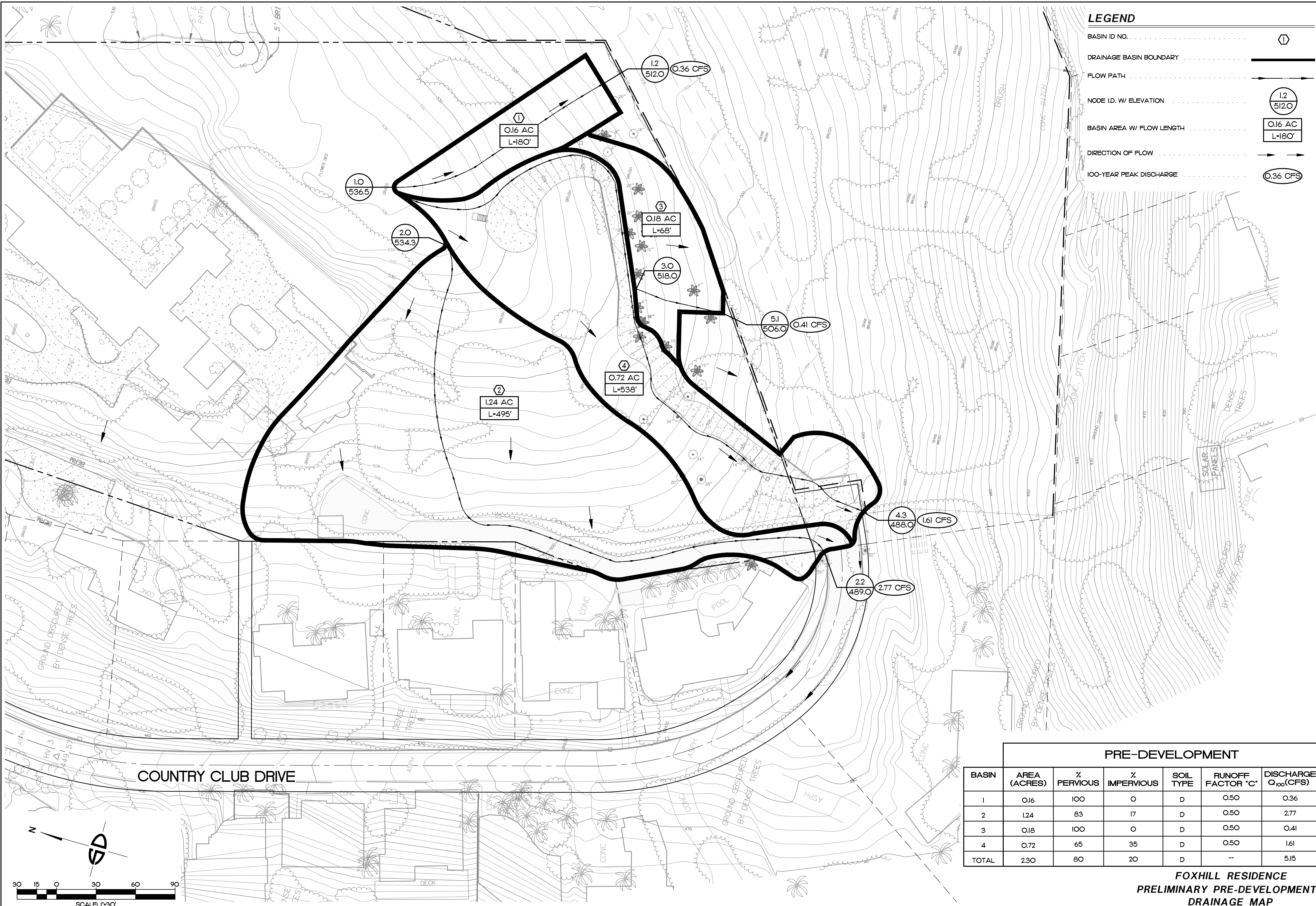
NO. 4
 DATE: [Blank]
 DESCRIPTION: [Blank]

SHEET NO. 1 OF 1
 JOB NO. LJ4741 (0-9)

SNIPES-DYE ASSOCIATES 8348 CENTER DRIVE, SUITE G, LA MESA, CA 91942-2910 (619) 697-9234, FAX (619) 460-2033

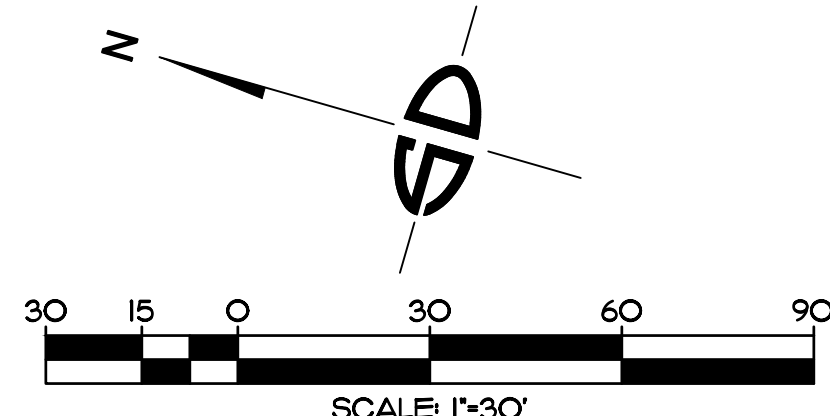
LEGEND

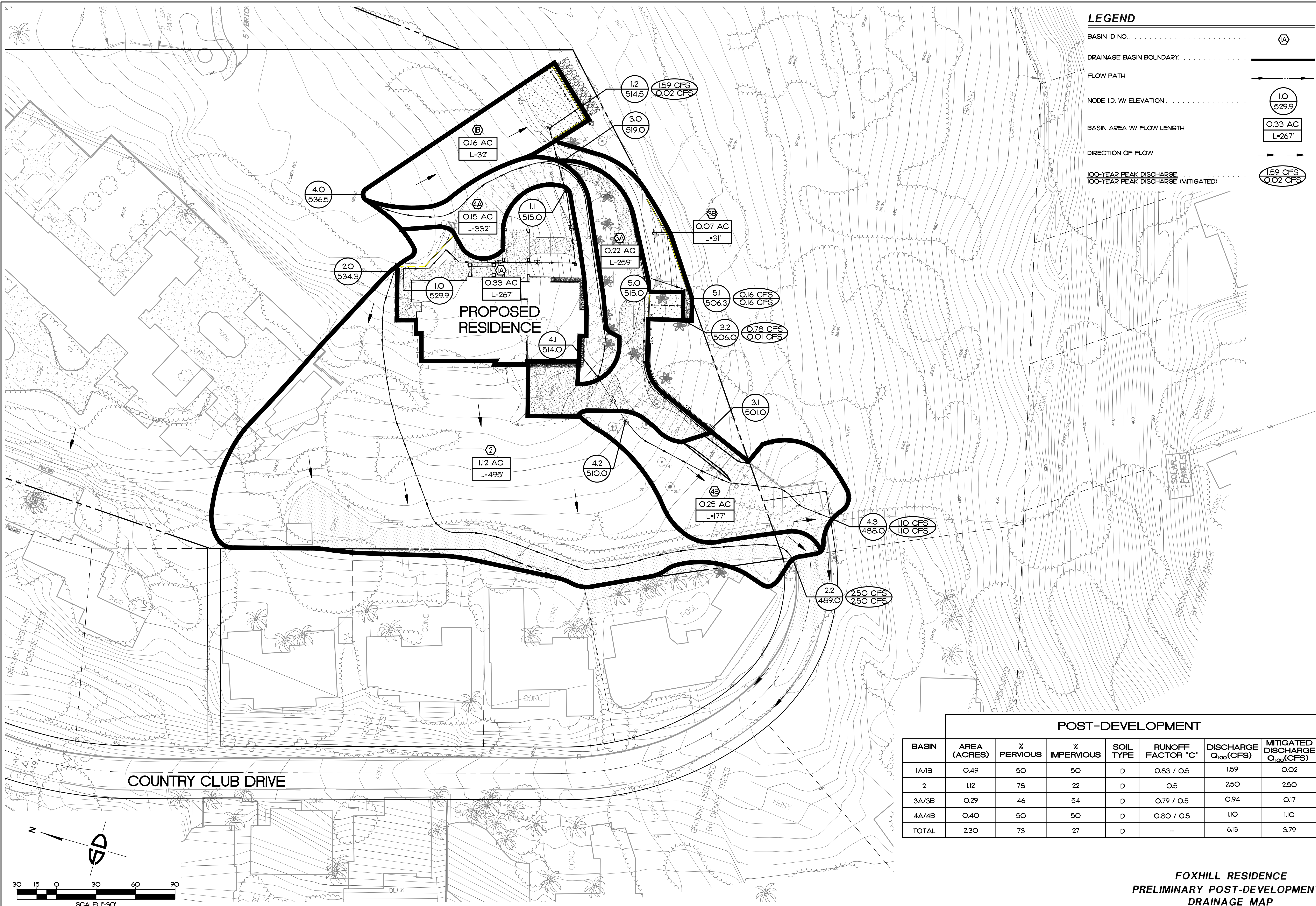
- BASIN ID NO. 1
- DRAINAGE BASIN BOUNDARY
- FLOW PATH
- NODE ID. W/ ELEVATION 1.2
512.0
- BASIN AREA W/ FLOW LENGTH 0.16 AC
L=180'
- DIRECTION OF FLOW
- 100-YEAR PEAK DISCHARGE 0.36 CFS



PRE-DEVELOPMENT						
BASIN	AREA (ACRES)	% PERVIOUS	% IMPERVIOUS	SOIL TYPE	RUNOFF FACTOR "C"	DISCHARGE Q ₁₀₀ (CFS)
1	0.16	100	0	D	0.50	0.36
2	1.24	83	17	D	0.50	2.77
3	0.18	100	0	D	0.50	0.41
4	0.72	65	35	D	0.50	1.61
TOTAL	2.30	80	20	D	--	5.15

**FOXHILL RESIDENCE
 PRELIMINARY PRE-DEVELOPMENT
 DRAINAGE MAP**





LEGEND

BASIN ID NO.	1A
DRAINAGE BASIN BOUNDARY	—
FLOW PATH	→
NODE ID. W/ ELEVATION	1.0 529.9
BASIN AREA W/ FLOW LENGTH	0.33 AC L=267'
DIRECTION OF FLOW	→
100-YEAR PEAK DISCHARGE	1.59 CFS
100-YEAR PEAK DISCHARGE (MITIGATED)	0.02 CFS

POST-DEVELOPMENT

BASIN	AREA (ACRES)	% PERVIOUS	% IMPERVIOUS	SOIL TYPE	RUNOFF FACTOR "C"	DISCHARGE Q ₁₀₀ (CFS)	MITIGATED DISCHARGE Q ₁₀₀ (CFS)
1A/1B	0.49	50	50	D	0.83 / 0.5	1.59	0.02
2	1.12	78	22	D	0.5	2.50	2.50
3A/3B	0.29	46	54	D	0.79 / 0.5	0.94	0.17
4A/4B	0.40	50	50	D	0.80 / 0.5	1.10	1.10
TOTAL	2.30	73	27	D	--	6.13	3.79

PRELIMINARY POST-CONSTRUCTION DRAINAGE MAP

FOXHILL RESIDENCE
7007 COUNTRY CLUB DRIVE
LA JOLLA, CA 92037

DESIGNER	RE	BY	NO	DATE	REVISION	DESCRIPTION
BRANN	DO	SDA				
CHECKED	SPN	SDA				
DATE	06-07-19					

SNIPES-DYE ASSOCIATES 8348 CENTER DRIVE, SUITE G, LA MESA, CA 91942-2910 (619) 697-9234, FAX (619) 460-2033

SHEET 1 OF 1 SHEETS
JOB NO. LJA741 (0-9)

PRE-DEVELOPMENT DRAINAGE CALCULATIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1305

Analysis prepared by:

Snipes-Dye associates
civil engineers & land surveyors
8348 Center Drive, Suite G, La Mesa, CA 91942
(619) 697-9234 (619) 460-2033 fax
www.snipesdye.com

***** DESCRIPTION OF STUDY *****
* **FOXHILL GUEST QUARTERS TPM** *
* **PRELIMINARY PRE-DEVELOPMENT DRAINAGE CALCULATIONS** *
* SDA NO. LJ4742 *

FILE NAME: LJ4742PR.DAT
TIME/DATE OF STUDY: 12:55 09/21/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000

*USER SPECIFIED:

NUMBER OF [TIME,INTENSITY] DATA PAIRS = 16

- 1) 5.000; 4.500
- 2) 10.000; 3.500
- 3) 20.000; 2.500
- 4) 30.000; 2.000
- 5) 40.000; 1.700
- 6) 50.000; 1.500
- 7) 60.000; 1.300
- 8) 120.000; 0.860
- 9) 180.000; 0.760
- 10) 240.000; 0.560
- 11) 300.000; 0.480
- 12) 360.000; 0.430
- 13) 420.000; 0.400
- 14) 480.000; 0.360
- 15) 540.000; 0.340
- 16) 600.000; 0.320

SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 1.00 TO NODE 1.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 180.00
UPSTREAM ELEVATION(FEET) = 536.50
DOWNSTREAM ELEVATION(FEET) = 512.00
ELEVATION DIFFERENCE(FEET) = 24.50
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.013
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.497
SUBAREA RUNOFF(CFS) = 0.36
TOTAL AREA(ACRES) = 0.16 **TOTAL RUNOFF(CFS) = 0.36**

FLOW PROCESS FROM NODE 2.00 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 495.00
UPSTREAM ELEVATION(FEET) = 534.30
DOWNSTREAM ELEVATION(FEET) = 489.00
ELEVATION DIFFERENCE(FEET) = 45.30
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.164
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.467
SUBAREA RUNOFF(CFS) = 2.77
TOTAL AREA(ACRES) = 1.24 **TOTAL RUNOFF(CFS) = 2.77**

FLOW PROCESS FROM NODE 3.00 TO NODE 5.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 68.00
UPSTREAM ELEVATION(FEET) = 518.00
DOWNSTREAM ELEVATION(FEET) = 506.00
ELEVATION DIFFERENCE(FEET) = 12.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.134
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.41
TOTAL AREA(ACRES) = 0.18 **TOTAL RUNOFF(CFS) = 0.41**

FLOW PROCESS FROM NODE 1.00 TO NODE 4.30 IS CODE = 21

=====
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 538.00
UPSTREAM ELEVATION(FEET) = 536.50
DOWNSTREAM ELEVATION(FEET) = 488.00
ELEVATION DIFFERENCE(FEET) = 48.50
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.190
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.462
SUBAREA RUNOFF(CFS) = 1.61
TOTAL AREA(ACRES) = 0.72 TOTAL RUNOFF(CFS) = 1.61
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.7 TC(MIN.) = 5.19
PEAK FLOW RATE(CFS) = 1.61
=====

=====
END OF RATIONAL METHOD ANALYSIS

POST-DEVELOPMENT DRAINAGE CALCULATIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1305

Analysis prepared by:

Snipes-Dye associates
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(619) 697-9234 (619) 460-2033 fax
www.snipesdye.com

***** DESCRIPTION OF STUDY *****
* **FOXHILL GUEST QUARTERS TPM** *
* **PRELIMINARY POST-DEVELOPMENT DRAINAGE CALCULATIONS** *
* SDA NO. LJ4742 *

FILE NAME: LJ4742PO.DAT
TIME/DATE OF STUDY: 14:59 09/21/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000

*USER SPECIFIED:

NUMBER OF [TIME,INTENSITY] DATA PAIRS = 16

- 1) 5.000; 4.500
- 2) 10.000; 3.500
- 3) 20.000; 2.500
- 4) 30.000; 2.000
- 5) 40.000; 1.700
- 6) 50.000; 1.500
- 7) 60.000; 1.300
- 8) 120.000; 0.860
- 9) 180.000; 0.760
- 10) 240.000; 0.560
- 11) 300.000; 0.480
- 12) 360.000; 0.430
- 13) 420.000; 0.400
- 14) 480.000; 0.360
- 15) 540.000; 0.340
- 16) 600.000; 0.320

SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 1.00 TO NODE 1.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 267.00
UPSTREAM ELEVATION(FEET) = 529.90
DOWNSTREAM ELEVATION(FEET) = 515.00
ELEVATION DIFFERENCE(FEET) = 14.90
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.740
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.23
TOTAL AREA(ACRES) = 0.33 TOTAL RUNOFF(CFS) = 1.23

FLOW PROCESS FROM NODE 1.10 TO NODE 1.20 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 515.00 DOWNSTREAM(FEET) = 514.50
FLOW LENGTH(FEET) = 32.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.12
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 4.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.23
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 2.78
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 1.20 = 299.00 FEET.

FLOW PROCESS FROM NODE 1.20 TO NODE 1.20 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7222
SUBAREA AREA(ACRES) = 0.16 SUBAREA RUNOFF(CFS) = 0.36
TOTAL AREA(ACRES) = 0.5 TOTAL RUNOFF(CFS) = 1.59
TC(MIN.) = 2.78

FLOW PROCESS FROM NODE 2.00 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

```

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 495.00
UPSTREAM ELEVATION(FEET) = 534.30
DOWNSTREAM ELEVATION(FEET) = 489.00
ELEVATION DIFFERENCE(FEET) = 45.30
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.164
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.467
SUBAREA RUNOFF(CFS) = 2.50
TOTAL AREA(ACRES) = 1.12 TOTAL RUNOFF(CFS) = 2.50

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 3.10 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 259.00
UPSTREAM ELEVATION(FEET) = 519.00
DOWNSTREAM ELEVATION(FEET) = 501.00
ELEVATION DIFFERENCE(FEET) = 18.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.924
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.78
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 0.78

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 4.10 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 332.00
UPSTREAM ELEVATION(FEET) = 536.50
DOWNSTREAM ELEVATION(FEET) = 510.00
ELEVATION DIFFERENCE(FEET) = 26.50
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.702
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.54
TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.54

*****
FLOW PROCESS FROM NODE 4.10 TO NODE 4.20 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====

```

ELEVATION DATA: UPSTREAM(FEET) = 510.40 DOWNSTREAM(FEET) = 510.00
 FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.19
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 4.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.54
 PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 2.80
 LONGEST FLOWPATH FROM NODE 4.00 TO NODE 4.20 = 370.00 FEET.

 FLOW PROCESS FROM NODE 4.20 TO NODE 4.30 IS CODE = 51

 >>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 510.00 DOWNSTREAM(FEET) = 488.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 210.00 CHANNEL SLOPE = 0.1048
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 40.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 0.50
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) = 0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.82
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.81
 AVERAGE FLOW DEPTH(FEET) = 0.07 TRAVEL TIME(MIN.) = 0.92
 Tc(MIN.) = 3.72
 SUBAREA AREA(ACRES) = 0.25 SUBAREA RUNOFF(CFS) = 0.56
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.613
 TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 1.10

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.09 FLOW VELOCITY(FEET/SEC.) = 3.66
 LONGEST FLOWPATH FROM NODE 4.00 TO NODE 4.30 = 580.00 FEET.

 FLOW PROCESS FROM NODE 5.00 TO NODE 5.10 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 =====

*USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) = 0
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 31.00
 UPSTREAM ELEVATION(FEET) = 515.00
 DOWNSTREAM ELEVATION(FEET) = 506.30
 ELEVATION DIFFERENCE(FEET) = 8.70
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.791
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.16
 TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.16

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.1 TC(MIN.) = 2.79
PEAK FLOW RATE(CFS) = 0.16
=====

=====
END OF RATIONAL METHOD ANALYSIS
=====

POST-DEVELOPMENT MITIGATION CALCULATIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

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Ver. 23.0 Release Date: 07/01/2016 License ID 1305

Analysis prepared by:

Snipes-Dye associates
civil engineers & land surveyors

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(619) 697-9234 (619) 460-2033 fax
www.snipesdye.com

***** DESCRIPTION OF STUDY *****
* **FOXHILL GUEST QUARTERS TPM** *
* **PRELIMINARY POST-DEVELOPMENT DRAINAGE CALCULATIONS (MITIGATED)** *
* SDA NO. LJ4742 *

FILE NAME: LJ4742PM.DAT
TIME/DATE OF STUDY: 09:20 09/23/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000

*USER SPECIFIED:

NUMBER OF [TIME,INTENSITY] DATA PAIRS = 16

- 1) 5.000; 4.500
- 2) 10.000; 3.500
- 3) 20.000; 2.500
- 4) 30.000; 2.000
- 5) 40.000; 1.700
- 6) 50.000; 1.500
- 7) 60.000; 1.300
- 8) 120.000; 0.860
- 9) 180.000; 0.760
- 10) 240.000; 0.560
- 11) 300.000; 0.480
- 12) 360.000; 0.430
- 13) 420.000; 0.400
- 14) 480.000; 0.360
- 15) 540.000; 0.340
- 16) 600.000; 0.320

SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 1.00 TO NODE 1.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 267.00
UPSTREAM ELEVATION(FEET) = 529.90
DOWNSTREAM ELEVATION(FEET) = 515.00
ELEVATION DIFFERENCE(FEET) = 14.90
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.740
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.23
TOTAL AREA(ACRES) = 0.33 TOTAL RUNOFF(CFS) = 1.23

FLOW PROCESS FROM NODE 1.10 TO NODE 1.20 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 515.00 DOWNSTREAM(FEET) = 514.50
FLOW LENGTH(FEET) = 32.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.12
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 4.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.23
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 2.78
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 1.20 = 299.00 FEET.

FLOW PROCESS FROM NODE 1.20 TO NODE 1.20 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7222
SUBAREA AREA(ACRES) = 0.16 SUBAREA RUNOFF(CFS) = 0.36
TOTAL AREA(ACRES) = 0.5 TOTAL RUNOFF(CFS) = 1.59
TC(MIN.) = 2.78

FLOW PROCESS FROM NODE 1.20 TO NODE 1.20 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 5.00 RAIN INTENSITY(INCH/HOUR) = 4.50
TOTAL AREA(ACRES) = 0.49 TOTAL RUNOFF(CFS) = 0.02

FLOW PROCESS FROM NODE 2.00 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 495.00
UPSTREAM ELEVATION(FEET) = 534.30
DOWNSTREAM ELEVATION(FEET) = 489.00
ELEVATION DIFFERENCE(FEET) = 45.30
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.164
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.467
SUBAREA RUNOFF(CFS) = 2.50
TOTAL AREA(ACRES) = 1.12 TOTAL RUNOFF(CFS) = 2.50

FLOW PROCESS FROM NODE 3.00 TO NODE 3.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 259.00
UPSTREAM ELEVATION(FEET) = 519.00
DOWNSTREAM ELEVATION(FEET) = 501.00
ELEVATION DIFFERENCE(FEET) = 18.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.924
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.78
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 0.78

FLOW PROCESS FROM NODE 3.10 TO NODE 3.20 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 5.00 RAIN INTENSITY(INCH/HOUR) = 4.50
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 0.01

FLOW PROCESS FROM NODE 4.00 TO NODE 4.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
 S.C.S. CURVE NUMBER (AMC II) = 0
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 332.00
 UPSTREAM ELEVATION(FEET) = 536.50
 DOWNSTREAM ELEVATION(FEET) = 510.00
 ELEVATION DIFFERENCE(FEET) = 26.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.702
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.54
 TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.54

FLOW PROCESS FROM NODE 4.10 TO NODE 4.20 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 510.40 DOWNSTREAM(FEET) = 510.00
 FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.19
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 4.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.54
 PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 2.80
 LONGEST FLOWPATH FROM NODE 4.00 TO NODE 4.20 = 370.00 FEET.

FLOW PROCESS FROM NODE 4.20 TO NODE 4.30 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 510.00 DOWNSTREAM(FEET) = 488.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 210.00 CHANNEL SLOPE = 0.1048
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 40.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 0.50
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) = 0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.82
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.81
 AVERAGE FLOW DEPTH(FEET) = 0.07 TRAVEL TIME(MIN.) = 0.92
 Tc(MIN.) = 3.72
 SUBAREA AREA(ACRES) = 0.25 SUBAREA RUNOFF(CFS) = 0.56
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.613
 TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 1.10

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.09 FLOW VELOCITY(FEET/SEC.) = 3.66
 LONGEST FLOWPATH FROM NODE 4.00 TO NODE 4.30 = 580.00 FEET.

FLOW PROCESS FROM NODE 5.00 TO NODE 5.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 31.00
UPSTREAM ELEVATION(FEET) = 515.00
DOWNSTREAM ELEVATION(FEET) = 506.30
ELEVATION DIFFERENCE(FEET) = 8.70
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.791
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.500
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.16
TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.16

=====

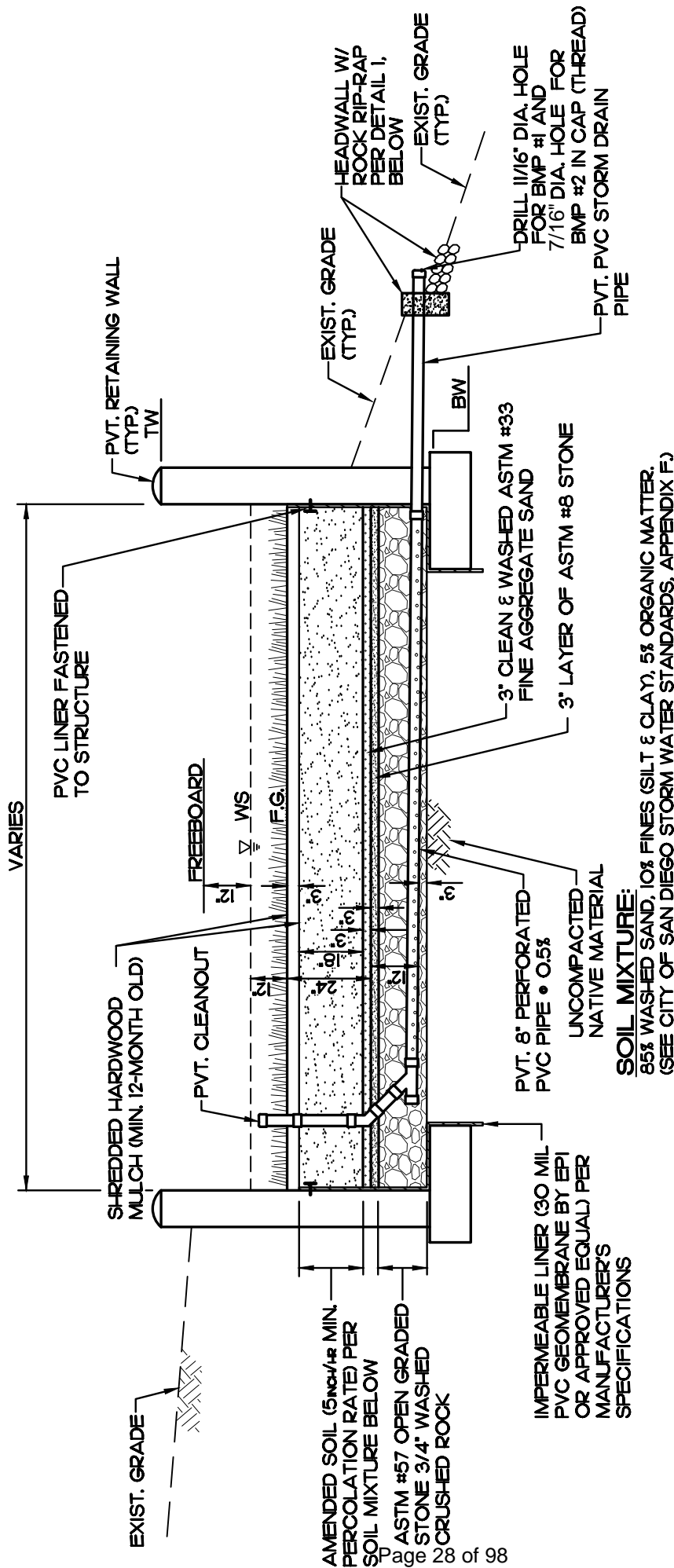
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.1 TC(MIN.) = 2.79
PEAK FLOW RATE(CFS) = 0.16

=====

=====

END OF RATIONAL METHOD ANALYSIS

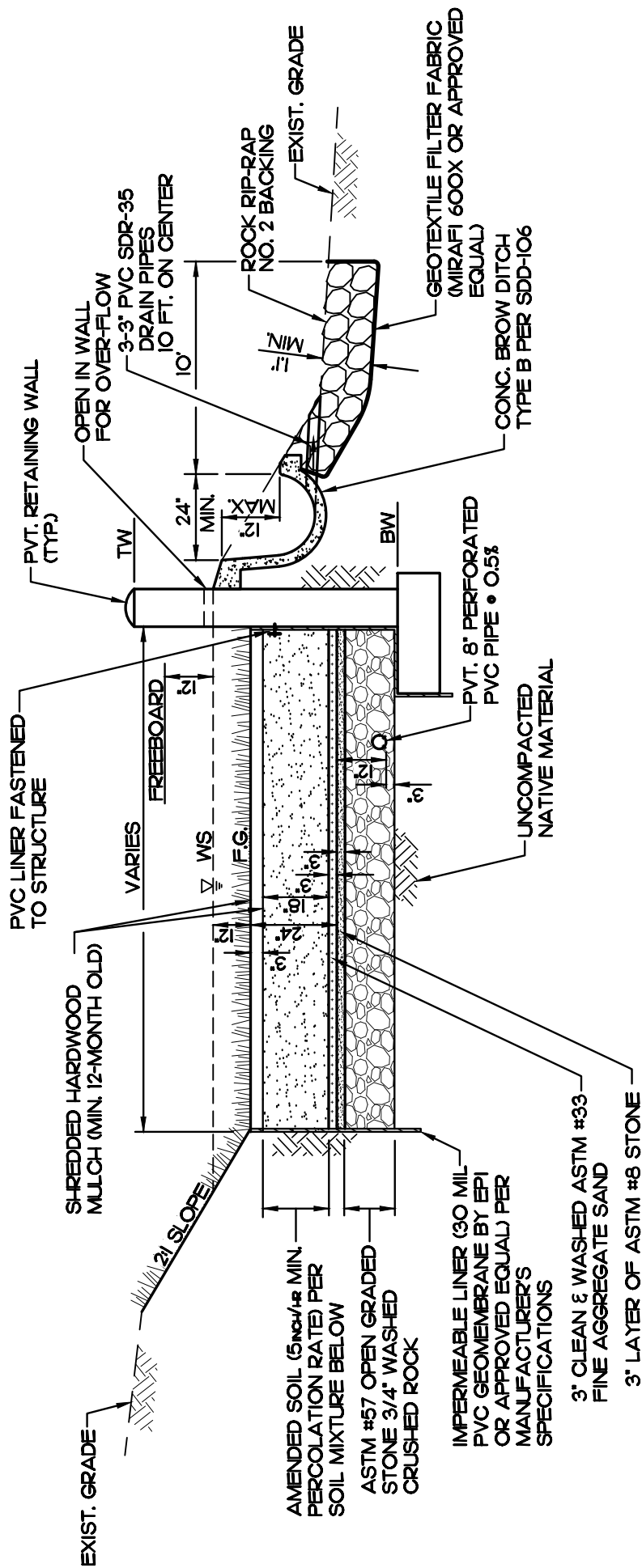
DETENTION CALCULATIONS



A TYPICAL SECTION
NO SCALE

PVT. BIOFILTRATION W/ PARTIAL RETENTION
NO SCALE

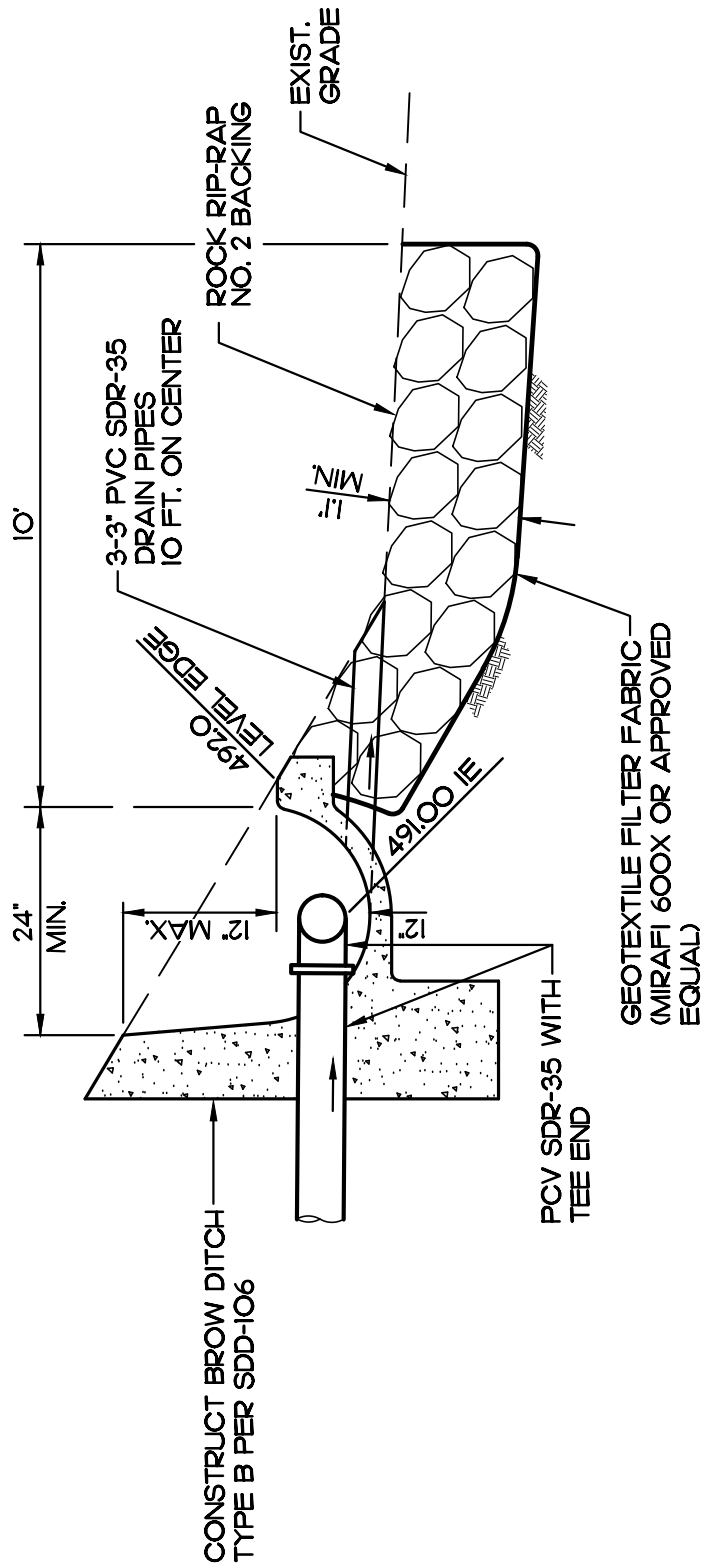
SOIL MIXTURE:
85% WASHED SAND, 10% FINES (SILT & CLAY), 5% ORGANIC MATTER.
(SEE CITY OF SAN DIEGO STORM WATER STANDARDS, APPENDIX F.)



SOIL MIXTURE:
 85% WASHED SAND, 10% FINES (SILT & CLAY), 5% ORGANIC MATTER.
 (SEE CITY OF SAN DIEGO STORM WATER STANDARDS, APPENDIX F.)

B TYPICAL SECTION
 NO SCALE

PVT. BIOFILTRATION W/ PARTIAL RETENTION
 NO SCALE



1 - STORM DRAIN OUTLET STRUCTURE (PVT.)
 NO SCALE

BIOFILTRATION BASIN 1

Reservoir Report

Reservoir No. 1 - Biofiltration Basin #1

Hydraflow Hydrographs by Intelisolve

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	514.50	1,230	0	0
1.00	515.50	1,324	1,277	1,277
1.50	516.00	1,371	674	1,951

Culvert / Orifice Structures

11/16" Orifice

	[A]	[B]	[C]	[D]
Rise in	= 0.7	0.0	0.0	0.0
Span in	= 0.7	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 511.75	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

Weir

	[A]	[B]	[C]	[D]
Crest Len ft	= 1.00	0.00	0.00	0.00
Crest El. ft	= 515.50	0.00	0.00	0.00
Weir Coeff.	= 2.50	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	514.50	0.02	---	---	---	0.00	---	---	---	---	0.02
1.00	1,277	515.50	0.02	---	---	---	0.00	---	---	---	---	0.02
1.50	1,951	516.00	0.03	---	---	---	0.88	---	---	---	---	0.91

Hydrograph Plot

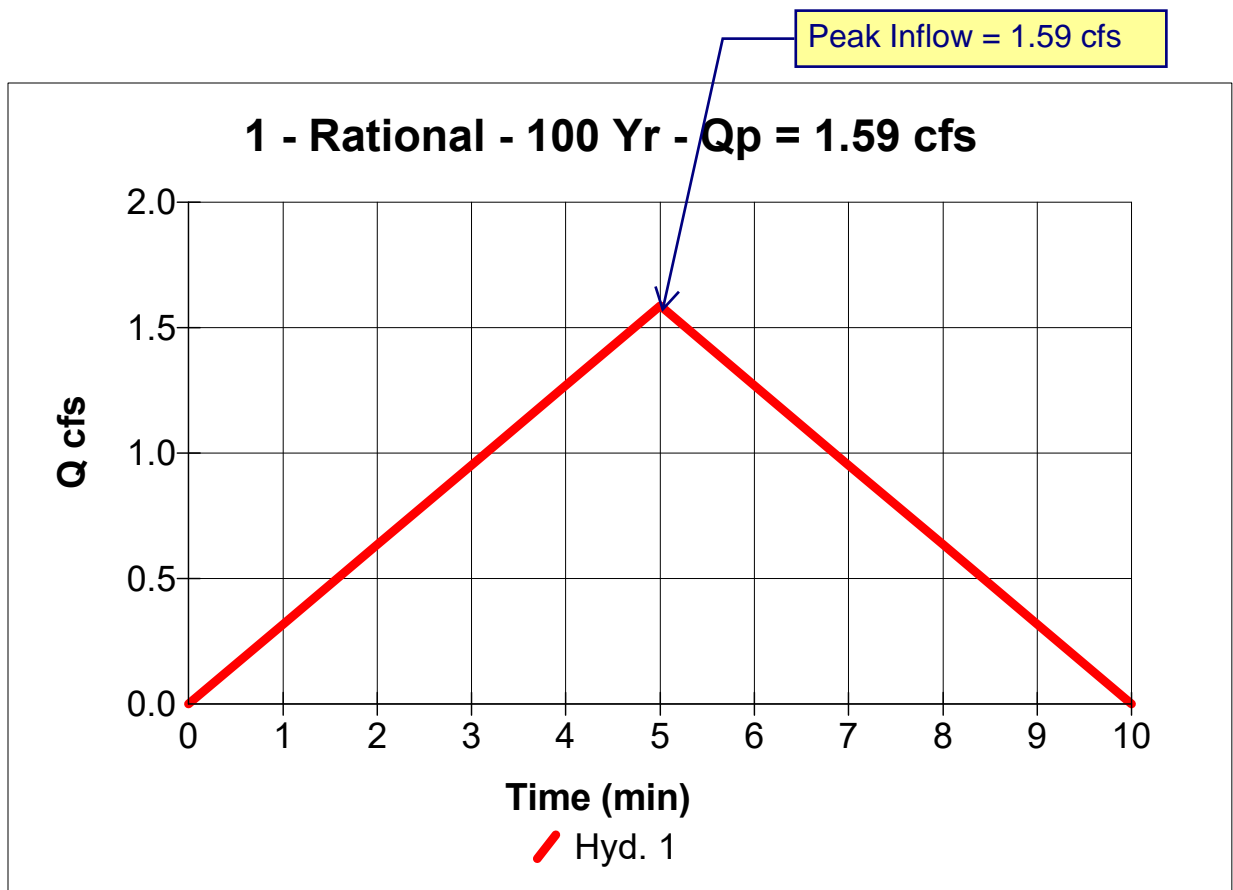
Hyd. No. 1

Basin 1

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.5 ac
Intensity = 4.495 in/hr
IDF Curve = Foxhill.idf

Peak discharge = 1.59 cfs
Time interval = 1 min
Runoff coeff. = 0.72
Time of conc. (Tc) = 5 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 476 cuft



Hydrograph Report

Hyd. No. 1

Basin 1

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.5 ac
Intensity = 4.495 in/hr
IDF Curve = Foxhill.idf

Peak discharge = 1.59 cfs
Time interval = 1 min
Runoff coeff. = 0.72
Time of conc. (Tc) = 5 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 476 cuft

Hydrograph Discharge Table

Time -- Outflow
(min cfs)

1	0.32
2	0.63
3	0.95
4	1.27
5	1.59 <<
6	1.27
7	0.95
8	0.63
9	0.32

Peak Inflow = 1.59 cfs



...End

Hydrograph Plot

Hyd. No. 2

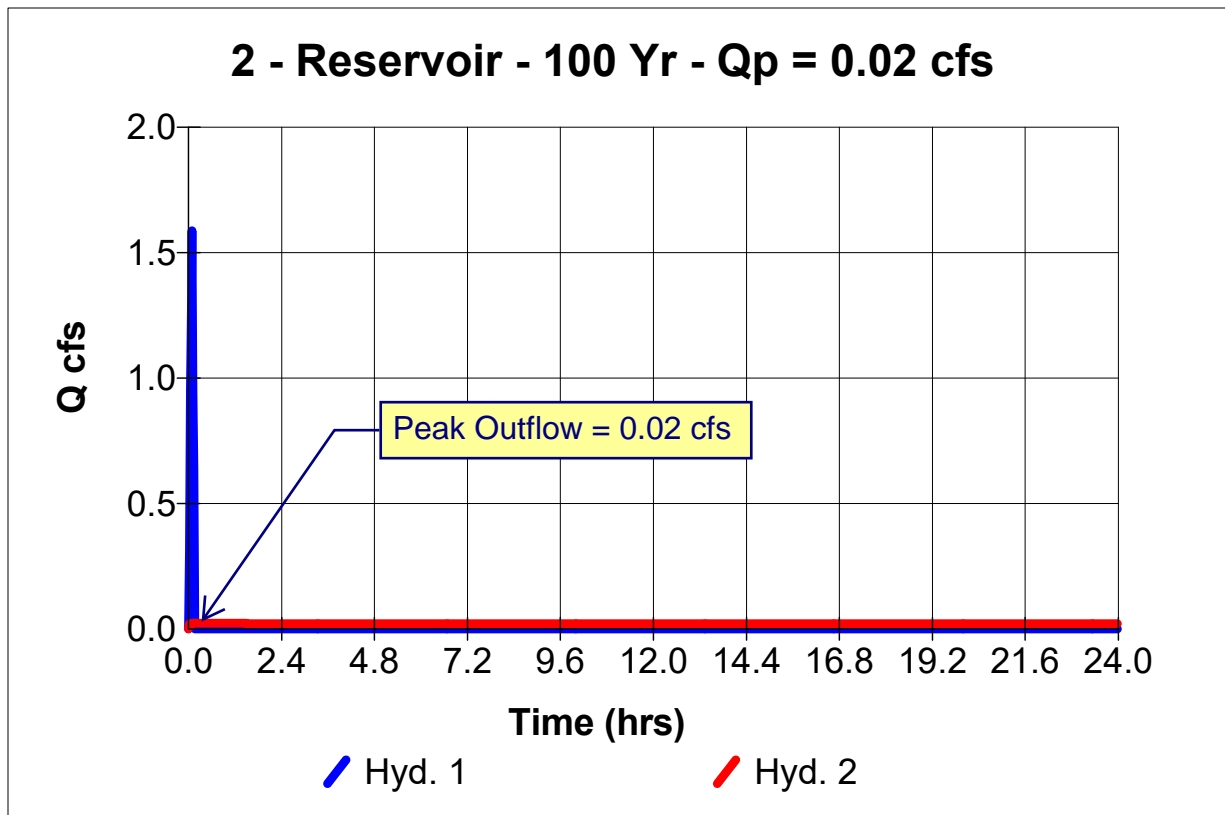
BMP-1

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 1
Max. Elevation = 514.86 ft

Peak discharge = 0.02 cfs
Time interval = 1 min
Reservoir name = Biofiltration B
Max. Storage = 464 cuft

Storage Indication method used.

Hydrograph Volume = 1,786 cuft



Hydrograph Report

Hyd. No. 2

BMP-1

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 1
 Max. Elevation = 514.86 ft

Peak discharge = 0.02 cfs
 Time interval = 1 min
 Reservoir name = Biofiltration Bas
 Max. Storage = 464 cuft

Storage Indication method used.

Outflow hydrograph volume = 1,786 cuft

Hydrograph Discharge Table

Peak Inflow = 1.59 cfs

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1	0.32	514.51	0.02	----	----	----	----	----	----	----	----	0.02
2	0.63	514.53	0.02	----	----	----	----	----	----	----	----	0.02
3	0.95	514.56	0.02	----	----	----	----	----	----	----	----	0.02
4	1.27	514.62	0.02	----	----	----	----	----	----	----	----	0.02
5	1.59 <<	514.68	0.02	----	----	----	----	----	----	----	----	0.02
6	1.27	514.75	0.02	----	----	----	----	----	----	----	----	0.02
7	0.95	514.80	0.02	----	----	----	----	----	----	----	----	0.02
8	0.63	514.84	0.02	----	----	----	----	----	----	----	----	0.02
9	0.32	514.86	0.02	----	----	----	----	----	----	----	----	0.02
10	0.00	514.86 <<	0.02	----	----	----	----	----	----	----	----	0.02 <<
11	0.00	514.86	0.02	----	----	----	----	----	----	----	----	0.02
12	0.00	514.86	0.02	----	----	----	----	----	----	----	----	0.02
13	0.00	514.86	0.02	----	----	----	----	----	----	----	----	0.02
14	0.00	514.86	0.02	----	----	----	----	----	----	----	----	0.02
15	0.00	514.86	0.02	----	----	----	----	----	----	----	----	0.02
16	0.00	514.86	0.02	----	----	----	----	----	----	----	----	0.02
17	0.00	514.86	0.02	----	----	----	----	----	----	----	----	0.02
18	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
19	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
20	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
21	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
22	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
23	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
24	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
25	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
26	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
27	0.00	514.85	0.02	----	----	----	----	----	----	----	----	0.02
28	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
29	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
30	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
31	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
32	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
33	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
34	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
35	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
36	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
37	0.00	514.84	0.02	----	----	----	----	----	----	----	----	0.02
38	0.00	514.83	0.02	----	----	----	----	----	----	----	----	0.02

Peak Outflow = 0.02 cfs

Continues on next page...

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1416	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1417	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1418	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1419	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1420	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1421	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1422	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1423	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1424	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1425	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1426	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1427	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1428	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1429	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1430	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1431	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1432	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1433	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1434	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1435	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1436	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1437	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1438	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1439	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02
1440	0.00	514.50	0.02	----	----	----	----	----	----	----	----	0.02

...End

BIOFILTRATION BASIN 2

Reservoir Report

Reservoir No. 2 - Biofiltration Basin #2

Hydraflow Hydrographs by Intelisolve

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	510.00	500	0	0
1.00	511.00	500	500	500
2.00	512.00	500	500	1,000

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.4	0.0	0.0	0.0
Span in	= 0.4	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 506.83	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

7/16" Orifice

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 3.00	0.00	0.00	0.00
Crest El. ft	= 511.00	0.00	0.00	0.00
Weir Coeff.	= 2.50	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Weir

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	510.00	0.01	---	---	---	0.00	---	---	---	---	0.01
1.00	500	511.00	0.01	---	---	---	0.00	---	---	---	---	0.01
2.00	1,000	512.00	0.01	---	---	---	7.50	---	---	---	---	7.51

Hydrograph Plot

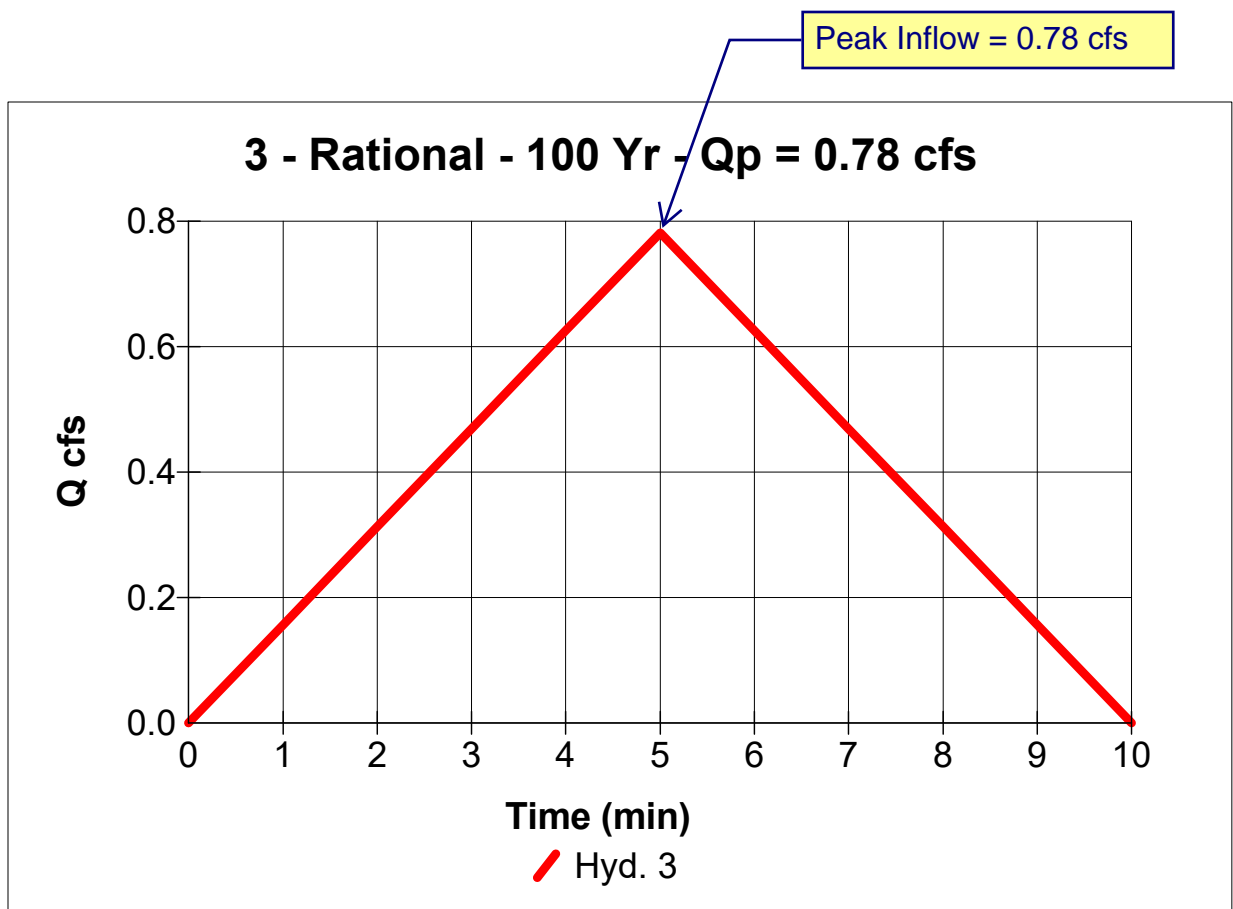
Hyd. No. 3

Basin 2

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.2 ac
Intensity = 4.495 in/hr
IDF Curve = Foxhill.idf

Peak discharge = 0.78 cfs
Time interval = 1 min
Runoff coeff. = 0.79
Time of conc. (Tc) = 5 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 234 cuft



Hydrograph Report

Hyd. No. 3

Basin 2

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.2 ac
Intensity = 4.495 in/hr
IDF Curve = Foxhill.idf

Peak discharge = 0.78 cfs
Time interval = 1 min
Runoff coeff. = 0.79
Time of conc. (Tc) = 5 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 234 cuft

Hydrograph Discharge Table

Time -- Outflow
(min cfs)

1	0.16
2	0.31
3	0.47
4	0.62
5	0.78 <<
6	0.62
7	0.47
8	0.31
9	0.16

Peak Inflow = 0.78 cfs

...End

Hydrograph Plot

Hyd. No. 4

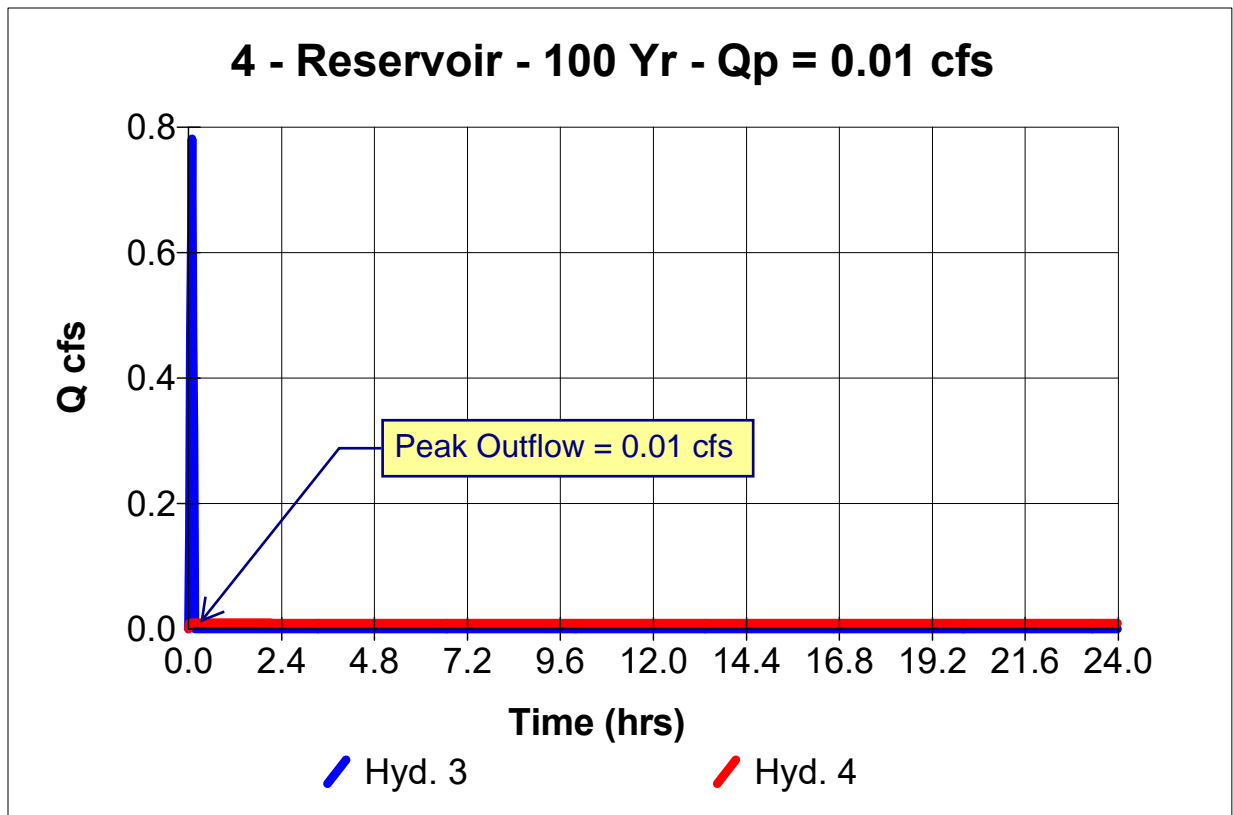
BMP-2

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 3
Max. Elevation = 510.46 ft

Peak discharge = 0.01 cfs
Time interval = 1 min
Reservoir name = Biofiltration B
Max. Storage = 229 cuft

Storage Indication method used.

Hydrograph Volume = 781 cuft



Hydrograph Report

Hyd. No. 4

BMP-2

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 510.46 ft

Peak discharge = 0.01 cfs
 Time interval = 1 min
 Reservoir name = Biofiltration Bas
 Max. Storage = 229 cuft

Storage Indication method used.

Outflow hydrograph volume = 781 cuft

Hydrograph Discharge Table

Peak Inflow = 0.78 cfs

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1	0.16	510.01	0.01	----	----	----	----	----	----	----	----	0.01
2	0.31	510.04	0.01	----	----	----	----	----	----	----	----	0.01
3	0.47	510.08	0.01	----	----	----	----	----	----	----	----	0.01
4	0.62	510.15	0.01	----	----	----	----	----	----	----	----	0.01
5	0.78 <<	510.23	0.01	----	----	----	----	----	----	----	----	0.01
6	0.62	510.31	0.01	----	----	----	----	----	----	----	----	0.01
7	0.47	510.38	0.01	----	----	----	----	----	----	----	----	0.01
8	0.31	510.42	0.01	----	----	----	----	----	----	----	----	0.01
9	0.16	510.45	0.01	----	----	----	----	----	----	----	----	0.01
10	0.00	510.46 <<	0.01	----	----	----	----	----	----	----	----	0.01 <<
11	0.00	510.46	0.01	----	----	----	----	----	----	----	----	0.01
12	0.00	510.46	0.01	----	----	----	----	----	----	----	----	0.01
13	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
14	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
15	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
16	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
17	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
18	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
19	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
20	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
21	0.00	510.45	0.01	----	----	----	----	----	----	----	----	0.01
22	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
23	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
24	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
25	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
26	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
27	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
28	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
29	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
30	0.00	510.44	0.01	----	----	----	----	----	----	----	----	0.01
31	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01
32	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01
33	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01
34	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01
35	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01
36	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01
37	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01
38	0.00	510.43	0.01	----	----	----	----	----	----	----	----	0.01

Peak Outflow = 0.00 cfs

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1416	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1417	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1418	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1419	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1420	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1421	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1422	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1423	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1424	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1425	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1426	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1427	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1428	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1429	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1430	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1431	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1432	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1433	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1434	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1435	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1436	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1437	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1438	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1439	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01
1440	0.00	510.00	0.01	----	----	----	----	----	----	----	----	0.01

...End